Low Temperature Atmospheric Pressure Plasma Sterilization Shower

Completed Technology Project (2015 - 2016)

Project Introduction

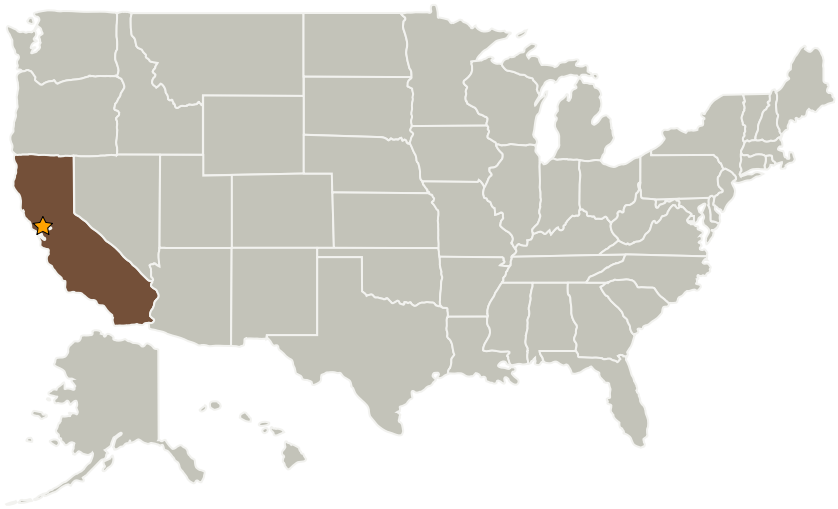
The goal is to develop an atmospheric plasma jet that is capable of depositing a wide variety of materials on flexible substrates such as paper, plastic, cotton and thin metal foils. This would be a dry alternative to inkjet printing. There has been an increased interest in fabricating electronic devices on flexible substrates with enhanced emphasis on recyclable materials.

Atmospheric pressure plasma may be a low cost solution to provide 100% efficiency with respect to sterilization. It creates oxygen atoms, ions which are effective in sterilization in addition to the help from the UV of the plasma, ion bombardment and the mild heat the plasma produces. This combination of effects is the reason for the 100% efficiency. We have already constructed a single plasma jet and ignited the plasma at atmospheric pressure. This minimize the risk. The nozzle diameter now is 5 mm. Power consumption is extremely low. Major Milestones for FY16: We will show at the end of CIF 100% killing of e-coli within minutes which is not possible using dry heat. Multi jet design and demonstration.

Anticipated Benefits

We will be able to contribute to NASA instrument proposals, Mars in situ resource utilization (ISRU) proposals, proposals to US Army and NIH. The approach can potentially be extended to printed electronics applications where plasma jets can carry the material to be deposited. Printed electronics, flexible electronics will have major impact on future missions.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations
California

Stories

Deposition of Nanomaterials onto Flexible Surfaces and 3-D Objects *(https://techport.nasa.gov/file/35200)*

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Center Innovation Fund: ARC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

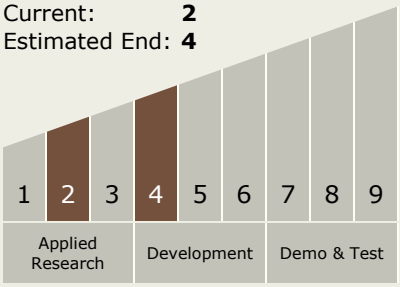
Harry Partridge

Principal Investigator:

Meyya Meyyappan

Technology Maturity (TRL)

Start: **2**
Current: **2**
Estimated End: **4**



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Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.2 Mission Infrastructure, Sustainability, and Supportability
    - TX07.2.2 In-Situ Manufacturing, Maintenance, and Repair